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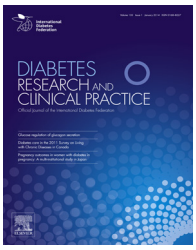

Nursing home patients with diabetes: Prevalence, drug treatment and glycemic control

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ABSTRACT

Aims: Determine prevalence of diabetes, and describe use of blood glucose lowering (BGL) drugs and glycemic control in Norwegian nursing homes.

Methods: In this cross-sectional study we collected details of BGL drugs, capillary blood glucose measurements (CBGM) in the last four weeks and HbA1c measurements in the last 12 months from the medical records of patients with diabetes, within a population of 742 long-term care patients from 19 randomly selected nursing homes in Western Norway. Descriptive statistics were applied, and Pearson's chi-squared ($P \leq 0.05$) or non-overlapping 95% confidence intervals were interpreted as significant effects.

Results: 116 patients (16%) had diabetes, 100 of these gave informed consent and medical data were available. BGL treatment was as follows: (1) insulin only (32%), (2) insulin and oral antidiabetics (OADs) (15%), (3) OADs only (27%) and (4) no drugs (26%). Patients with cognitive impairment were less likely to receive medical treatment ($P = 0.04$). CBGM and HbA1c measurements were performed for 73% and 77% of patients, respectively. Mean HbA1c was 7.3% (57 mmol/mol), 46% of patients had an HbA1c <7.0% (53 mmol/mol), and CBGM consistent with risk of hypoglycemia was found for 60% of these patients.

Conclusions: Prevalence of diabetes and BGL treatment in Norwegian nursing homes is comparable to other European countries. Although special care seems to be taken when choosing treatment for patients with cognitive impairment, there are signs of overtreatment in the population as a whole. The strict glycemic control unveiled may negatively affect these frail patients' quality of life and increase the risk of early death.

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1. Introduction

The prevalence of diabetes is increasing worldwide, with the highest rise in the population ≥60 years of age [1]. Diabetes in the elderly is metabolically distinct from younger patients [2], associated with an accelerated progression of both functional and cognitive decline [3–5] and is a common cause of nursing home admissions [6]. The reported prevalence of diabetes in nursing homes varies from 11 to 36% around the world [7–13].

The majority of nursing home patients receive multiple drug therapy and drug-related problems (DRPs) are common [14]. Patients with diabetes have a higher burden of comorbidities compared to patients without diabetes [10,15], further complicating management of care. Hypoglycemic episodes occur frequently, due to both an overly intensive drug regime [7,11,16] and concurrent diseases [17,18]. Symptoms of hypoglycemia in the elderly are often unspecific and less marked compared to in younger patients [19,20] and may be mistaken for symptoms of their cognitive or functional impairment, or even stroke [20,21]. Hypoglycemia is associated with an increased risk of adverse clinical outcomes, such as cardiovascular disease, dementia and death [22,23]. Lack of guidelines for blood glucose monitoring [7,24], poor recognition of clinical symptoms that may call for unscheduled measurements [9], and unclear limits of blood glucose concentrations where the physician should be notified [24], may further increase the risk and impact of hypoglycemia.

Guidelines for treatment have, until recently, been sparse for frail, older patients. However, the new recommendations concerning treatment of diabetes in this population have a strong focus on reducing the risk of hypoglycemia in addition to limiting hyperglycemia, both through reducing excessive medical treatment and providing appropriate and sufficient blood glucose monitoring. [25,26].

In Norway, a study from the Tromsø area that examined subjects >69 years of age either receiving nursing care at home or in an institution found a known diabetes prevalence of 20% [27]. However, this study did not discriminate between patients that received nursing care at home and patients who were staying in an institution; neither did they include patients with severe illness or dementia. Hence, diabetes prevalence in Norwegian nursing homes has not been studied exclusively, and the quality of diabetes care has not previously been investigated for these patients. This study aims to determine the prevalence of diabetes in Norwegian nursing homes, and investigate the use of blood glucose lowering drugs, frequency of capillary blood glucose measurements (CBGM) and HbA1c measurements, and glycemic control in this population. In addition, these aspects of diabetes care are compared with the newer recommendations for diabetes treatment and follow-up.

2. Subjects, materials and methods

2.1. Study design and participants

This cross-sectional study was performed within a population of long-term care patients in nursing homes between February and August 2012. Long-term care patients were defined as patients admitted for a stay of ≥3 months. We drew a random sample from all nursing homes (n = 180) within the geographical area of the Western Norway Regional Health Authority. A total of 26 nursing homes were invited to participate and 20 of these accepted, of which one withdrew after data collection had begun. The 19 nursing homes were located in both rural and urban areas, with a median long-term care population of 29 patients (range 8–136). Sixteen of the nursing homes were owned by the municipality, whereas three were owned by private foundations.

To ensure patients' confidentiality nursing home staff collected depersonalized data about year of birth, sex, and which patients had a diagnosis of diabetes. Nursing home staff also assessed diabetes patients' capacity to give consent and collected written, informed consent from patients. In cases where patients themselves lacked capacity to consent, their next of kin was asked to give consent on their behalf. The study was approved by a regional committee for medical research ethics (REK Vest).

The researcher (LMA) examined the nursing home medical records of all consenting diabetes patients and registered any blood glucose lowering drugs. They were defined as all drugs within code A10 –"Drugs used in diabetes" in the Anatomical Therapeutic Chemical (ATC) classification system [28]. The researcher also collected information on number of measurements and concentrations of capillary blood glucose and HbA1c within the last four weeks and twelve months, respectively. In this population, we define hypoglycemia as a blood glucose concentration <4.0 mmol/L and risk of hypoglycemia as a fasting blood glucose concentration <6.0 mmol/L [26]. Hyperglycemia is defined as a blood glucose concentration >11.0 mmol/L [26].

2.2. Statistical analyses

Descriptive statistics for normally distributed continuous variables are expressed as means with 95% confidence intervals (CI). Non-overlapping confidence intervals are interpreted as significant effects. Continuous variables with a skewed distribution are presented as median with range. Categorical variables are presented as frequencies and percentages. The 95% CI for the percentages were estimated by the 2.5 and 97.5 percentiles from non-parametric bootstrapped data (10,000 datasets were simulated for each CI). Pearson's chi-squared were used to test for significant effects. P-values ≤ 0.05 were considered statistically significant. Statistical analyses were carried out using IBM SPSS Statistics 20.0 (IBM, Armonk, NY) and Microsoft Excel 2010 (Microsoft, Redmond, WA, USA).

3. Results

3.1. Demographics

A total of 742 long-term care patients lived within the 19 participating nursing homes. Of these, 116 had a diagnosis of diabetes (16%). Patients with diabetes did not differ from the patients without diabetes in mean age (85.2 y [CI: 83.8, 86.6] vs.

Table 1 – Overview of drugs prescribed for regulating blood glucose (ATC-code: A10) divided into insulin injections and oral antidiabetics (OADs) (*n* = 74).

	ATC-code	Substance	Number of patients with prescription[a]	Number of regular prescriptions	Number of prn[b] prescriptions
Insulins A10A	A10AB05	Insulin aspart	31	3	31
	A10AC01	Insulin isophane	25	25	0
	A10AD05	Insulin aspart	9	9	1
	A10AB01	Insulin isophane	7	0	7
	A10AB04	Insulin lispro	3	1	2
	A10AE05	Insulin detemir	3	3	0
	A10AE04	Insulin glargine	1	1	0
	A10AD04	Insulin lispro	1	1	0
Other antidiabetics A10B	A10BA02	Metformin	27	27	0
	A10BB12	Glimepiride	18	18	0
	A10BB07	Glipizide	1	1	0

[a] As some patients are prescribed the drug both regular and prn, this number will not always add up to the sum of regular prescriptions + prn prescriptions.
[b] Prn = pro re nata/as needed medication.

86.0 y [CI: 85.3, 86.7]) or in male to female ratio (0.49 vs. 0.37, $P = 0.22$).

The study population consisted of 100 consenting patients with diabetes, of which 52 were able to give informed consent themselves. The 16 patients not consenting did not differ from the consenting patients in age, in male to female ratio, or in capacity to consent.

Seventy-five patients were registered with type 2 diabetes, five with type 1 diabetes, and for twenty patients information about type of diabetes was not given in the nursing home medical records.

3.2. *Drug regime*

Nearly half of the patients ($n = 47$) were prescribed insulin, 32 of which were prescribed insulin only and 15 of which were prescribed insulin and oral antidiabetics (OADs). Of the patients with only a prn (*pro re nata*–as needed) prescription for insulin ($n = 11$), eight were in the insulin + OAD group. Patients were prescribed a range of eleven different drugs for lowering blood glucose (Table 1). Insulins most frequently prescribed were insulin aspart ($n = 44$) and insulin isophane ($n = 32$). Metformin ($n = 27$) and glimepiride ($n = 18$) were the most commonly prescribed OADs.

A quarter of the patients ($n = 26$) received no blood glucose lowering drugs (Table 2). These did not differ from other patients in mean age, male to female ratio or type of diabetes registered in their medical records. However, the percentage of patients being prescribed blood glucose lowering drugs was significantly higher for patients with capacity to consent compared to patients without capacity to consent (82.7% vs. 64.6%, $P = 0.04$). The patients who received medical treatment for their diabetes had an average of 1.8 [CI: 1.6, 1.9] prescribed drugs for lowering blood glucose (range 1–3). Two of the patients registered with type 1 diabetes were prescribed an OAD (metformin) in addition to insulin.

3.3. *Glycemic control*

Seventy-three of 100 patients had one or more capillary blood glucose measurements (CBGM) in the last four weeks. Median number of CBGM was significantly higher for patients receiving regular insulin injections compared to the other treatment groups ($P < 0.01$) (Table 2). Thirteen patients had daily CBGM, twelve of which received regular insulin injections and one patient who received sulfonylurea as a regular medication.

Of the patients who had a record of CBGM in the last four weeks, 60% had recorded one or more measurements of blood glucose concentrations in the range of hypoglycemia (<4.0 mmol/L) and/or risk of hypoglycemia (fasting blood glucose <6.0 mmol/L). Fifteen percent of all recorded CBGM were in the range of hypoglycemia or risk of hypoglycemia (Table 3).

All patients who were prescribed insulin had at least one recorded episode of a CBGM <6.0 mmol/L (fasting), and 62% of these patients also had a record of CBGM >11.0 mmol/L. For the ''OAD group'' the numbers were 48% and 11%, respectively. None of the patients in the ''No drugs group'' had a record of CBGM <6.0 mmol/L, whilst 8% had a record of CBGM >11.0 mmol/L. A record of CBGM <6.0 mmol/L was significantly associated with higher mean HbA1c value (7.8% [CI: 7.3, 8.3] (61 mmol/mol [CI: 56, 67]) vs. 6.5% [CI: 6.1, 6.9] (48 mmol/mol [CI: 44, 52])). Patients with a record of CBGM >11.0 mmol/L also had a significantly higher mean HbA1c value compared to those with no recordings >11.0 mmol/L (8.3% [CI: 7.7, 8.9] (67 mmol/mol [CI: 60, 74]) vs. 6.8% [CI: 6.4, 7.2] (51 mmol/mol [CI: 46, 55])). We did not find significant differences in mean HbA1c value between patients with a record of CBGM <4.0 mmol/L and patients with no recordings <4.0 mmol/L (8.0% [CI: 7.1, 9.0] (64 mmol/mol [CI: 53, 75]) vs. 7.2% [CI: 6.8, 7.6] (56 mmol/mol [CI: 51, 60])), or between patients with a record of CBGM compared to those with no recordings of CBGM the last four weeks (7.5% [CI: 7.0, 7.9] (58 mmol/mol [CI: 53, 62]) vs. 6.9% [CI: 6.1, 7.8] (52 mmol/mol [CI: 43, 61])). Neither did we find an association between number of CBGM and last recorded HbA1c value (data not shown).

Twenty-three patients had no record of HbA1c measurements during the last 12 months, 14 of which were prescribed blood glucose lowering drugs. Forty patients had one recorded HbA1c value, and in 37 patients the number of measurements

Table 2 – Frequency of capillary blood glucose measurements (CBGM) by drug treatment.

	Insulin						OADs only			No drugs			Total		
	Regular (n = 36)			Prn (n = 11)			(n = 27)			(n = 26)			(n = 100)		
Frequency of CBGM last four weeks, median (range)	10	(0–121)		3	(0–23)		1	(0–32)		1	(0–12)		3	(0–121)	
	n	(%)	[95% CI]	n	(%)	[95% CI]	n	(%)	[95% CI]	n	(%)	[95% CI]	n	(%)	[95% CI]
Number of patients with a record of CBGM last four weeks	33	(91.7)	[80.6,100]	9	(81.8)	[54.5,100]	16	(59.3)	[40.7,77.8]	15	(57.7)	[38.5,76.9]	73	(73.0)	[64.0,81.0]
≥1 CBGM/day	12	(33.3)	[19.4,50.0]	0	–	–	1	(3.7)	[0.0,11.1]	0	–	–	13	(13.0)	[7.0,20.0]
≥1 CBGM/week, but <1 CBGM/day	18	(50.0)	[33.3,66.7]	4	(36.4)	[9.1,63.6]	2	(7.4)	[0.0,18.5]	7	(26.9)	[11.5,46.2]	31	(31.0)	[22.0,40.0]
≥1 CBGM/month, but <1 CBGM/week	3	(8.3)	[0.0,19.4]	5	(45.5)	[18.2,72.7]	13	(48.1)	[29.6,66.7]	8	(30.8)	[15.4,50.0]	29	(29.0)	[20.0,38.0]
<1 CBGM/month	3	(8.3)	[0.0,19.4]	2	(18.2)	[0.0,45.5]	11	(40.7)	[22.2,59.3]	11	(42.3)	[23.1,61.5]	27	(27.0)	[19.0, 36.0]

Table 3 – Results of capillary blood glucose measurements (CBGM) the last four weeks from 73 patients.

	Number of patients (n = 73)		Number of CBGM (n = 1006)	
Blood glucose concentration	n	(%)	n	(%)
<4.0 mmol/L[a]	10	(13.7)	31	(3.1)
<6.0 mmol/L[b]	35	(47.9)	122	(12.1)
>11.0 mmol/L[a]	34	(46.6)	367	(36.5)

[a] Random blood glucose concentration, not necessarily fasting.
[b] Fasting blood glucose concentration.

ranged from two to six. Last recorded value of HbA1c ranged from 4.7% (28 mmol/mol) to 12.4% (112 mmol/mol), with an average of 7.3% [CI: 7.0, 7.7] (57 mmol/mol [CI: 53, 60]). Distribution of HbA1c values by treatment is shown in Fig. 1. Mean value of HbA1c was significantly higher when prescribed insulin (8.0% [CI: 7.4, 8.6] (64 mmol/mol [CI: 58, 70])) compared to patients prescribed only OADs (6.7% [CI: 6.4, 7.4] (52 mmol/mol [CI: 46, 57])) or patients who did not receive blood glucose lowering drugs (6.4% [CI: 5.8, 7.0] (46 mmol/mol [CI: 40, 53])).

Seven patients neither received CBGM in the last four weeks nor HbA1c measurements in the last 12 months. Four of these patients were prescribed blood glucose lowering drugs; three patients with a prescription for OADs only, and one patient with a prescription for a regular OAD and insulin prn.

Capacity to consent was not associated with a record of CBGM (58% vs. 37%, $P = 0.08$). Neither did we find an association between capacity to consent and having HbA1c measured the last twelve months (53% vs. 48% [$P = 0.81$]), nor last recorded value of HbA1c (7.4% [CI: 6.9, 7.9] (57 mmol/mol [CI: 51, 63]) vs. 7.3% [CI: 6.7, 7.8] (56 mmol/mol [CI: 50, 62])).

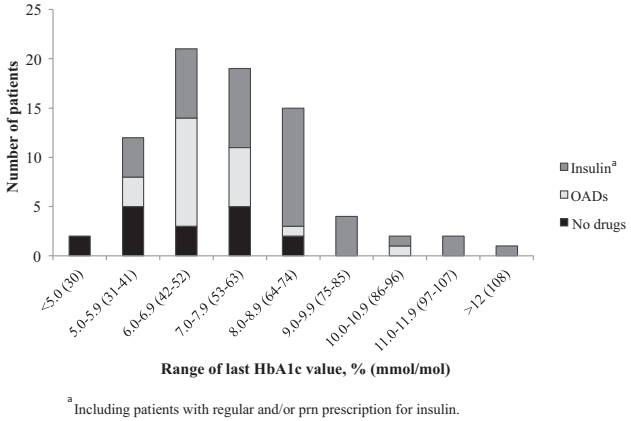

Figure 1 – Distribution of last recorded HbA1c value (%, mmol/mol) from 77 patients, sectioned into treatment categories "Insulin", "OADs" and "No drugs".

4. Discussion

Our results show that 16% of long-term care patients in Norwegian nursing homes have a known diagnosis of diabetes. This is consistent with findings from other European countries [7,11–13], and also comparable with the prevalence previously reported for the elderly population receiving nursing care either at home or in an institution in the Tromsø area in Norway [27]. The majority of the patients in our study (71%) receive blood glucose regulating drugs regularly, but frequency and level of glycemic control vary greatly among the patients.

Patients with diabetes were prescribed a variety of blood glucose lowering drugs (Table 1), and choice of drugs, average number of prescribed drugs, and proportion of patients in the different treatment groups are comparable to what are reported in other nursing home studies [7,11,29].

Metformin was the drug of choice for patients prescribed OADs, whilst a basal regime with NPH-insulin was common in insulin-treated patients (Table 1). This is consistent with current recommendations for older people with diabetes, although these also state that newer therapies may benefit selected patients [26]. Insulin detemir and insulin glargine have shown to be more beneficial than NPH-insulin for patients at higher risk of hypoglycemia [30]. The same is true for incretin mimetics in obese patients and DPP-4 inhibitors in malnourished patients [31]. However, limited knowledge of effect and safety of the newer therapies in the population aged ≥75 years, and higher costs may be an explanation for why these drugs are seldom or never prescribed [30,31].

On average, the patients who received medical treatment for their diabetes were prescribed more than one drug for lowering their blood glucose, and almost half of them receive regular insulin injections. The reason for this may be that advanced age is associated with a decline in glucose tolerance and β-cell function, leading to increased insulin resistance and impaired insulin secretion [32]. Progressive loss of glycemic control in type 2 diabetes with time, requiring several OADs and ultimately insulin to achieve appropriate treatment, is also well-known [33]. Although we do not have information about duration of diabetes in these patients, it is reasonable to believe that a number of them have had the disease for some time. Jorde and Hagen reported the average duration of diabetes to be 11.2 ± 8.2 years [27]. They found that 46% of the patients were treated with insulin compared to 47% of the patients in our study. However, the majority of the Tromsø patients received insulin together with OADs (35%), whilst in our population patients mostly used insulin alone (32%). This may be due to some demographic differences in our populations.

Low concentrations of fasting blood glucose (<6.0 mmol/L) and/or hypoglycemic episodes (<4.0 mmol/L) were found for 60% of the patients with a record of CBGM (Table 3), which may indicate overtreatment in these patients, but we do not know if these patients experienced clinical symptoms of hypoglycemia in these cases. However, as hypoglycemia is often overlooked in these patients [20,21] and also associated with an increased risk of cardiovascular events, dementia and death [22,23], this number is worrying. Furthermore, number of hypoglycemic episodes may be underestimated in our study, as only one third of patients receiving regular insulin have daily CBGM (Table 2). Frequent hypoglycemic episodes among nursing home patients using insulin have also been reported in other studies [9,11,34,35]. However, increased CBGM may not be the solution for all patients to solve the problem with hypoglycemia. Studies have shown that even with regular CBGM in these patients, recommended glucose targets were not met [36] and patients not at risk of hypoglycemia experienced unnecessary measurements [35]. Furthermore, clinical symptoms that called for unscheduled CBGM were overlooked [9], and the risk of hypoglycemic episodes still was a considerable issue [9,35,36]. Shorter periods, e.g. 24–72 h, with more frequent measurements, or even continuous glucose monitoring, may give a better understanding of the patient's diurnal variation in blood glucose than regular daily measurements.

Our study also showed that many patients who had experienced low concentrations of blood glucose also had a record of hyperglycemic episodes (>11.0 mmol/L). This glucose variability suggests that management of nursing home patients using insulin is challenging, and that hypoglycemic episodes might be a problem even with higher levels of HbA1c. It has been suggested that too much focus on treating a high HbA1c, rather than individualizing the care for the patient is the reason for this [21,37]. Guidelines recommend that HbA1c should be taken at least every six months, regardless of treatment and even if the patient's glycemic control is stable [25,38]. Over 60% of the patients in this study do not meet this recommendation, possibly compromising initiation and follow-up of treatment. Another worrying finding was that the medical records of 26 patients receiving blood glucose lowering drugs lacked information about level of glycemic control, either in form of a CBGM record, an HbA1c value, or both. Patients who receive medical treatment for their diabetes should receive some sort of measurement to decide their level of glycemic control, to make sure they receive the appropriate treatment.

The newer guidelines have advocated less stringent HbA1c goals (7.0–8.0% (53-64 mmol/mol)) for patients with advanced age, one or several comorbidities and/or an increased risk of hypoglycemia [25,26,38,39]. In our study, the levels of HbA1c were not as low as reported in similar studies [11,12,34], especially not for patients using insulin. Still, for 46% of the patients with a record of HbA1c measurement the last 12 months, the last HbA1c value was below the recommended limit of 7.0% (53 mmol/mol), whilst only a quarter of these patients were within the recommended interval of 7.0–8.0% (53–64 mmol/mol) (Fig. 1). Similar numbers were reported by Jorde and Hagen [27]. Too tight glycemic control in aging patients has been associated with adverse clinical outcomes [40,41]. The Action to Control Cardiovascular Risk in Diabetes (ACCORD) study reported significantly higher frequency of hypoglycemia requiring assistance, and also a significantly higher risk of death in patients receiving an intensive drug regime (mean HbA1c at study end 6.4% (46 mmol/mol)) compared with patients receiving standard therapy (mean HbA1c at study end 7.5% (58 mmol/mol)) [40]. Currie et al. showed that HbA1c values in the lower range (<7.5% (58 mmol/mol)) were significantly associated with an

increased risk of mortality in patients using insulin, compared to HbA1c values between 7.5% and 9.0% (58 and 75 mmol/mol) [41]. Furthermore, a more intensive glycemic control requires more drugs or more frequent dosing of drugs, and it also increases the risk of drug–drug or drug–disease interactions and adverse drug events. Norwegian nursing homes should to a greater extent adjust their HbA1c treatment goals according to the new recommendations, as many of the patients in our study had an HbA1c in the lower range. The high number of patients with a record of low blood glucose concentrations in our study further demonstrates the importance of less stringent HbA1c treatment goals for these patients, especially if they have a limited life expectancy and several comorbidities.

An interesting finding in our study was that lack of capacity to consent was significantly associated with not receiving blood glucose lowering drugs. However, we did not find any significant differences in receiving CBGM or HbA1c measurements, or average HbA1c results based on decisional capacity. A lack of decisional capacity is associated with impaired cognitive function [42], and differences in diabetes management due to impaired cognitive function have been reported [43–45]. However, in contrast to our findings, McNabney et al. report no difference in choice of oral agents between nursing home patients with different levels of both functional and cognitive impairment, and do find lower intensity of both CBGM and HbA1c measurements [45]. Less frequent HbA1c measurements for patients with dementia is also reported by Quinn et al. and Thorpe et al. [43,44]. None of these studies investigated differences in HbA1c results. While it is difficult to point out reasons for these differences, part of the explanation may be that a recent patient safety campaign in Norway has focused on minimizing drug treatment in nursing home patients, especially those with dementia [46]. Restrictions in both drug therapy and monitoring practices may be beneficial for patients with cognitive impairment. A recent study reported worsened cognitive performance for patients using metformin compared to those who were not [47], suggesting that excessive drug treatment may do more harm than good. According to our study, glycemic control of patients without capacity to consent is as good as that of patients with capacity to consent, even if they do receive less blood glucose lowering drugs.

To our knowledge, this is the first descriptive study of Norwegian nursing home patients with diabetes residing in long-term care. We included different sized nursing homes from three counties, located in both urban and rural areas. This should make the results representative for the general nursing home population in Norway. Our results also support findings in similar studies from other European countries, strengthening the knowledge basis for this population. As we did not collect information about length of stay, our results of the HbA1c measurements may be biased. Patients with a stay less than 12 months may have received HbA1c measurements that are not documented in the nursing home medical records. Transfer of medical information between care levels have been shown to sometimes be inadequate [48], which also raises concern about the validity of the treatment foundation. However, three out of four patients did have at least one record of an HbA1c result the last 12 months, giving a reasonable estimate of glycemic control in this population. We did not collect information about duration of diabetes, nutrition/diet, weight/BMI, other diagnoses, drugs or laboratory values from these patients, and hence could not investigate how these aspects may have influenced blood glucose lowering treatment and glycemic control. A more comprehensive diagnosis and medication review for these patients should be included in future studies, to gain a better understanding of the medical challenges and needs for these patients. Future research should also include a more thorough investigation of glycemic control in these patients, as well as CBGM and HbA1c measurement practices in nursing homes, as these aspects of care are essential for initiation and follow-up of treatment.

In conclusion, the prevalence and blood glucose lowering treatment of diabetes in Norwegian nursing homes is comparable to other European countries. Special care seems to be taken when choosing blood glucose lowering treatment for patients with cognitive impairment. However, the high number of insulin treated patients, together with several recordings of low blood glucose concentrations and low HbA1c values suggest that some patients are subject to overtreatment. This may result in lower quality of life and increase the risk of early death. Newer guidelines recommend less stringent HbA1c limits for older patients [25,26,38,39] and Norwegian nursing homes should adjust their treatment targets for patients with diabetes accordingly. Individual care planning should also be applied, especially for patients with high variability in glucose concentrations.

Conflict of interest statement

None

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